Claims

What is claimed is:

1. A method of forming a semiconductor device, comprising:

providing a surface within said semiconductor device;

providing a first feature on said surface;

providing a second feature on said surface; and

forming a polymer between said first feature and said second feature in a high-density plasma environment.

2. The method in claim 1, further comprising modifying said polymer within said high-density plasma environment.

3. The method in claim 2, wherein said step of modifying said polymer further comprises etching a portion of said polymer.

4. The method in claim 3, wherein said step of providing a first feature further comprises providing a first metallic feature; and providing a second feature further comprises providing a second metallic feature.

5. The method in claim 4, wherein said step of providing a first feature further comprises providing a first feature made of a metal; and providing a second feature further comprises providing a second feature made of said metal.

6. The method in claim 5, wherein said step of providing a first feature further comprises providing a first metal line; and providing a second feature further comprises providing a second metal line.

7. A method of processing a semiconductor device, comprising:

providing a first protruding feature on a layer of said semiconductor device;

providing a second protruding feature on said layer;

defining a recess between said first protruding feature and said second protruding feature; and

plasma-depositing a material within said recess.

8. The method in claim 7, wherein said step of plasma-depositing a material further comprises plasma-depositing a material comprising carbon and a halogen.

9. The method in claim 8, wherein said step of plasma-depositing a material further comprises plasma-depositing a hydrogen-free material.

10. The method in claim 7, wherein said step of plasma-depositing a material further comprises plasma-depositing a material comprising carbon and hydrogen.

11. The method in claim 10, wherein said step of plasma-depositing a material further comprises plasma-depositing a halogen-free material.

12. The method in claim 7, wherein said step of plasma-depositing a material further comprises depositing a material comprising carbon, a halogen, and hydrogen.

13. A method of depositing a polymer onto a wafer, comprising:

defining an opening between exposed metal protruding features on said wafer;

providing a plasma; and

exposing said opening to said plasma.

14. The method in claim 13, wherein said step of providing said plasma further comprises providing a high-density plasma.

15. The method in claim 14, wherein said step of providing a high-density plasma further comprises providing a plasma having a density higher than $10^{10}/cm^3$.

16. The method in claim 15 wherein said step of providing a high-density plasma further comprises providing a plasma having a density higher than $10^{11}/cm^3$.

17. The method in claim 16, wherein said step of providing a plasma further comprises providing a plasma comprising a selection from fluorocarbons and hydrofluorocarbons.

18. The method in claim 17, wherein said step of providing a plasma further comprises providing a plasma comprising a selection from C_2F_6 and CHF_3.

19. A method of providing a polymer between metal lines on a wafer, comprising:

providing a plasma source;

exposing said wafer to said plasma source;

introducing a feed gas to said wafer;

establishing a pressure around said wafer; and

forming said polymer between said metal lines using said feed gas.

20. The method in claim 19, wherein said step of providing a plasma source further comprises providing a plasma source chamber; and exposing said wafer to said plasma source further comprises placing said wafer in said plasma source chamber.

21. The method in claim 20, wherein said step of providing a plasma source further comprises providing an etching machine.

22. The method in claim 21, wherein said step of providing an etching machine further comprises providing a high-density plasma etching machine.

23. A method of forming a polymer, comprising:

providing a semiconductor device having at least two exposed metal lines; and

performing a process on said semiconductor device, wherein said process is defined by a plurality of parameters, comprising:

a source power magnitude,

a bias power magnitude,

a pressure,

a duration, and

a process gas flow rate.

24. The method in claim 23, wherein said step of performing said process further comprises:

providing a high-density plasma etcher having a plurality of process settings, comprising:

a source power setting,

a bias power setting,

a pressure setting,

a duration setting, and

a process gas flow rate setting; and

placing said semiconductor device in said etcher.

25. The method in claim 24, further comprising:

defining a recess between said exposed metal lines;

filling said recess with said polymer; and

allowing a formation of said polymer above said exposed metal lines.

26. The method of claim 25, wherein said step of allowing a formation of polymer above said exposed metal lines further comprises interactively establishing said plurality of process settings.

27. The method in claim 26, further comprising removing any of said polymer above said exposed metal lines.

28. The method in claim 27, further comprising removing said polymer while said semiconductor device is within said high-density plasma etcher.

29. A method of selectively forming a polymer, comprising:

providing a semiconductor device having a plurality of exposed protruding features;

providing an etcher having high-density plasma process settings, comprising:

a source power setting,

a bias power setting, and

a flow rate setting; and

exposing said semiconductor device to a high-density plasma process within said etcher.

30. The method in claim 29, further comprising:

defining at least one recess with said plurality of exposed protruding features;

filling said recess with said polymer; and

restricting formation of said polymer to within said recess.

31. The method in claim 30, wherein said step of defining at least one recess with said plurality of exposed protruding features comprises defining a recess between two protruding features of said plurality of protruding features.

32. The method in claim 31, wherein said step of restricting formation of said polymer to within said recess further comprises preventing a formation of said polymer above said two protruding features.

33. The method in claim 32, wherein said step of preventing a formation of said polymer above said two protruding features further comprises establishing said plasma process settings, wherein said plasma process settings interactively define a plurality of overflow parameters that allow formation of said polymer above said two protruding features, and wherein establishing said plasma process settings further comprises initiating at least one setting from a selection of settings comprising:

a source power setting lower than a source power setting that partially defines one of said overflow parameters;

a bias power setting higher than a bias power setting that partially defines one of said overflow parameters; and

a flow rate setting lower than a flow rate setting that partially defines one of said overflow parameters.

34. The method in claim 32, wherein said step of preventing a formation of said polymer above said two protruding features further comprises initiating a bias power setting generally greater that 0 watts.

35. The method in claim 34, wherein said step of providing a semiconductor device further comprises providing an in-process semiconductor device.

36. A method of selectively providing a material between two metal lines of a semiconductor device, comprising:

forming said material on said semiconductor device in a deposition environment; and

removing any excess of said material in an etching environment, wherein said etching environment is the same as said deposition environment.

37. The method in claim 36, wherein said step of forming said material further comprises forming said material in an etch chamber.

38. The method in claim 36, wherein said step of removing any excess of said material further comprises removing any excess of said material in a plasma deposition chamber.

39. A method of processing a wafer having metal lines, comprising:

providing a high-density plasma; and

forming a polymer between said metal lines using said high-density plasma.

40. A method of developing an in-process semiconductor device having a first metal line and a second metal line, comprising:

placing said device in a deposition and etch surrounding; and

forming a polymer between said first metal line and said second metal line.

41. The method in claim 40, further comprising:

providing a layer over said polymer; and

retaining a state of said polymer.

42. The method in claim 41, wherein said step of retaining said state of said polymer further comprises having a polymer with a thermal stability sufficient to withstand providing said layer.

43. The method in claim 42, wherein said step of providing said layer further comprises providing said layer outside of said deposition and etch surrounding.

44. A method of providing a polymer between metal features on a wafer, comprising:

performing a deposition on said wafer in a site; and

etching said wafer in the same general site used to perform said deposition.

45. The method in claim 44, wherein said step of etching said wafer further comprises etching said wafer generally simultaneously with performing said deposition.

46. The method in claim 45, wherein said step of performing deposition further comprises depositing said polymer on said wafer.